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Research & Development®

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The International Magazine of Research and Development

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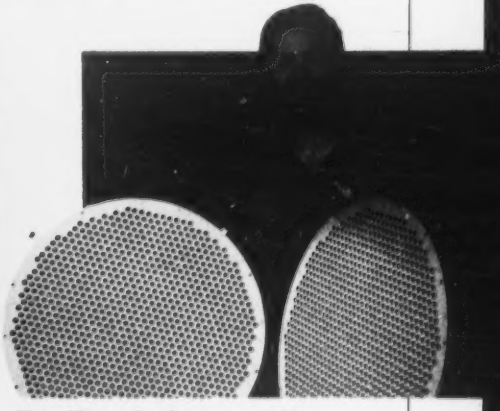

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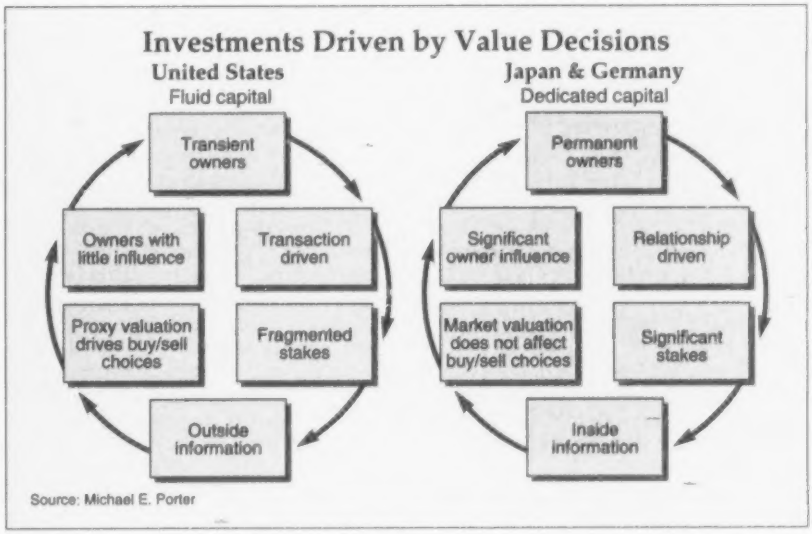
R&D BUSINESS

Link Competitiveness to Investment Choices



***Capital is distributed differently** in U.S. and foreign firms to meet the financial requirements of outside investors. U.S. capital decisions require faster paybacks.*

Short time horizons, high capital costs, poor quality, and ineffective management are often listed as the primary reasons why many U.S. companies cannot compete with their foreign counterparts.

Not so, says a new report. They're only symptoms of capital investment policies in the U.S. The report, *Capital Choices*, by Michael Porter, a professor at the Harvard Business School, Cambridge, MA, states that investor objectives are the reasons why U.S. companies operate differently than those in Japan and Germany.

In the U.S., return on investment and higher stock prices are the top two objectives of corporate owners, while improving products and market share are most important in Japan. Much of this comes about because many U.S. corporate owners are transient impersonal groups, such as pension funds, that base their investment decisions on superficial information. They also take no interest in company operations and have little influence on management behavior. These owners now own 60% of the equity in U.S. companies, compared to only 8% in 1950.

By contrast, Japanese and German firms have owners that tend to be permanent and take a more active role in management and operations. About 70% of German and Japanese corporate owners are permanent who allow investment funds to remain in the companies for long periods of time.

For a copy of the report ($42.50), call 202/785-3990. *—Tim Studt*

Environment Spurs Instrument Growth

Improvements in separation techniques and increased regulation of hazardous waste disposal continue to be the main drivers of analytical instrument growth in the U.S., according to a recent study by Market Intelligence Research Corp., Mountain View, CA.

The analytical instrument market increased more than 37% over the past four years to $1.85 billion, for a compound annual growth of 8.3%. Average annual growth is expected to increase to 8.8% over the next six years.

Molecular analysis instruments are projected to show the strongest growth during the 1992 to 1998 forecast period.

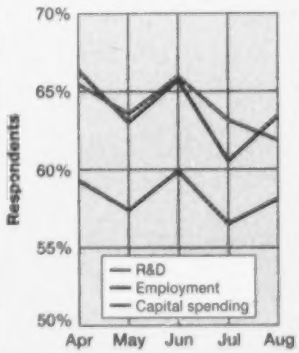
By 1998, they will hold a 35% share of the total market, while elemental analysis instruments are expected to decline in market share over the same period.

Average unit shipments of all instruments will rise at a slower rate than revenues, as increasingly sophisticated instruments with greater sensi-

DNA Instruments Booming

With an annual growth rate of more than 16%, DNA and protein sequencers are key growth sectors of the bioinstrumentation market though 1996, according to Strategic Directions Intl., a Los Angeles-based consulting firm.

DNA sequencers alone show a strong annual growth of nearly 18%. Protein sequencer sales are growing slower at 12%.



Opinions Mixed

Executives' confidence in their business plans were mixed in July, according to Cahners Economics, Newton, MA.

About 62% of the 400 executives surveyed thought their R&D efforts would remain stable or increase over the next few months, a 1.3 percentage-point drop from June. Employment and capital spending confidence increased slightly.

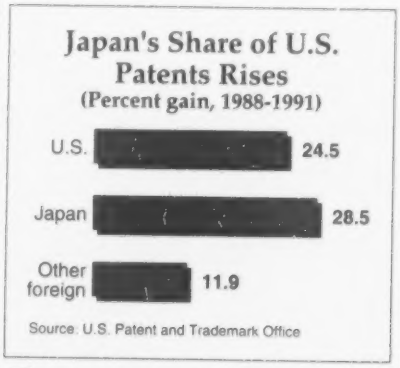
Should U.S. Revamp Patent System?

Congress is considering legislation that would fundamentally change the way U.S. patents are awarded. If the bills pass, the U.S. Patent and Trademark Office (PTO) would grant patents to those who file applications first rather than those who invent first, which is the current practice.

The proposed change is called "patent harmonization" because it would bring U.S. patent law into synch with patent laws of nearly every other country. As Robert Merges, professor of law at Boston Univ., describes it, "First-to-file provides settled rights immediately: Virtually as soon as you have filed, you know whether you have priority. First-to-invent, on the other hand, ensures fairness: The first actual inventor, rather than the one who is the first to rush to the patent office, receives the patent."

Proponents of patent harmonization claim the first-to-file method would be simpler and would eliminate the uncertainties associated with current U.S. law. Now, a patent award can be challenged after the fact by anyone who claims to have invented the product or process first. The resulting administrative "interference proceedings" can be costly and lengthy. Only in relatively few cases have patents been revoked and reawarded.

Last month, the Advisory Commission on Patent Law Reform assembled by former Commerce Secretary Robert Mosbacher recommended shifting to first-to-file, claiming that "more than 99.9% of the U.S. patent applications now being filed raise no dispute as to the identity of the first inventor."



The percentage gain in patents issued to Japanese and other foreign inventors has risen significantly.

Nevertheless, groups representing independent inventors, small businesses, and universities are opposing patent harmonization. They claim it would benefit big businesses and those with ample resources who would file patent applications quickly and often to protect potential inventions, even if the discoveries are neither totally new nor original. Individual inventors and those working for smaller companies would be harmed even if they did file first, the critics add, because competitors could file numerous modifications to the original patent in a "picket fence" strategy, forcing the true inventor to either sell the rights or engage in cross-licensing.

Supporters of patent harmonization argue that the benefits outweigh the risks. According to Harry Manbeck Jr., U.S. patent and trademarks commissioner, the "simplicity and certainty" of a first-to-file system "may well prove a significant advantage to small companies and independent inventors when contrasted with the complications, cost, and difficulties associated with proving that an inventor made an invention first."

And while first-to-invent is the

Auto Maker, National Lab Developing New Laser

Laser technician Scott Mitchell monitors a new solid-state laser as it cuts through a piece of steel. The laser is part of a $3 million cooperative research and development agreement between Lawrence Livermore (CA) National Laboratory and General Motors Corp., Detroit.

The laser, to be used in cutting and welding sheet metal, will provide the auto maker with manufacturing flexibility, the developers say.

The laser beam will be transported through an optical fiber to multiple workstations and be focused tighter than existing lasers. Fiber-optic transport provides new flexibility, as present industrial gas lasers require mirrors to direct the beams.

The laser technology should reduce costs and require less maintenance, the developers say.

standard for U.S. patents, first-to-file is the "absolute requirement" for the rest of the world, says Robert Armitage, a vice president of the Upjohn Co., Kalamazoo, MI. "Few, if any, U.S. inventors operate in isolation from the global marketplace," he says. "Today, U.S. inventors simply do not have the opportunity to leisurely develop technology or extensively test their inventions before filing a patent application. Who can risk *not* being first-to-file?"

What many on both sides of the fence agree on is that the patent system needs reform. The percentage of U.S. patents issued to foreign competitors, principally Japan, has been rising, with nearly half the total going overseas (chart). Another problem has been the inadequacy of the PTO to decide claims in such fast-emerging, highly technical areas as biotechnology. Until recently, patent examiners had to search the massive files manually, resulting in issuance delays and infringement suits (litigation jumped 52% from 1980 to 1990).

While the installation of a computerized database and the hiring and training of specialized examiners have helped, the problems of international competitiveness have not abated.

Though Congress has not yet acted on the patent bills, the PTO quietly has been negotiating international harmonization since 1984 under the auspices of the World Intellectual Property Organization, a United Nations agency. In this effort, the PTO has sought to strengthen international protections for U.S. inventors.

For instance, the draft international agreement includes a 12-month worldwide grace period protecting inventors against loss of patent rights when they disclose their inventions prior to filing—an important facet for U.S. inventors, especially those in the university community who must "publish or perish" and have lost rights abroad due to early publication.

Over years of negotiation, Manbeck says, the U.S. has resisted international pressure to adopt the first-to-file requirement. But now, in order to get other needed international protections, "the price for obtaining a treaty" will be to adopt the first-to-file approach, he says. —*Ted Agres*

Coal-Fired Power Plant Pares Pesky Pollutant

A worker inspects the lining of a flue section being installed at the coal-fired Drax Power Station in Yorkshire, England.

When completed in 1996, the flue-gas desulfurization plant will be the largest in the world. It is expected to remove 90% of sulfur dioxide emissions from the gas stream at the power station.

In operation, flue gas will pass through a large vessel called an absorber, which contains hundreds of nozzles that spray the gas with ground limestone and water. This causes the sulfur oxides in the flue gas to react chemically with the limestone, producing calcium sulfite.

The calcium sulfite is then reacted with oxygen to produce gypsum, which is bled away from the absorber and dried by centrifuges for use in wallboard, cement, and other products.

The power station is also fitting special burners to its boilers to reduce NO_x emissions.

Nanometer Cluster Collisions Spawn 'New Chemistry'

Nanometer-scale collisions of atomic clusters with solid substrates could play major roles in chemical process and materials science developments of the future. Supercomputer simulations conducted by Uzi Landman and his associates at Georgia Institute of Technology's School of Physics, Atlanta, suggest that such collisions at supersonic speeds could form the basis for new chemistries.

Studies by Landman's group involve clusters that create pressures up to 100,000 atm and temperatures as high as 4000 K when they hit a solid surface.

"We have very little knowledge about chemistry under these extreme conditions," Landman says. "Compounds that may not form under normal conditions may be produced under these circumstances."

In the latest work by Landman, Charles Cleveland, and Hai-Ping Cheng, programs were run to see what could happen when microscopic droplets of a material are hurled against a hard surface. (The surface, Landman notes, could be a chemical, metal, or ceramic.) The optimum velocities for unique results were found to fall in a 2 to 5 km/sec range.

"In those cases, we've found that on impact the front atoms stop sud-

***Supercomputer simulation** shows what happens as an argon cluster crashes into a sodium chloride surface.*

R&D SOFTWARE

HPLC Control Module

Revision 2.0 of the company's EZ-Chrom Chromatography Data System Software allows a user to set up and perform HPLC analyses and run concurrent HPLC and/or GC analyses from a PC, thus providing increased ease of use, higher productivity, and more efficient use of resources.
Shimadzu **Circle 340**

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Porous Materials **Circle 345**

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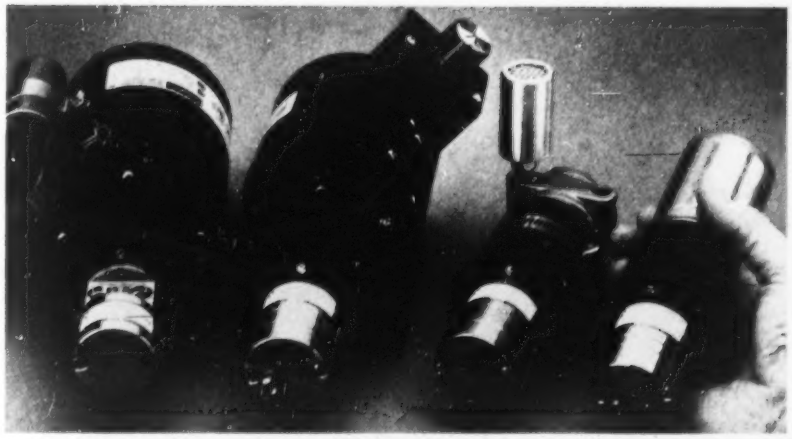

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